CASE REPORT/ OLGU SUNUMU

Evaluation of a Postanesthetic Palatal Ulceration with an Autofluorescence Screening Method: A Case Report and a Brief Literature Review

Postanestezik Palatal Ülserasyonunun Otofloresan Görüntüleme Yöntemi ile Değerlendirilmesi: Bir Olgu Sunumu ve Kısa Bir Literatür Taraması

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ABSTRACT

The use of local anesthesia applications in dentistry is a well-established and reliable practice. However, complications such as ulceration, necrosis, and mucosa sloughing may occur due to the firm and dense structure of the palatal mucosa after anesthesia. These complications may lead to a misdiagnosis of oral cancer. This case report aims to evaluate the suspicious lesion that developed after local anesthesia in a 45-year-old female patient who presented to the dental clinic with acute pulpitis pain using the VELscope® (Visually Enhanced Lesion Scope) autofluorescence screening method.

Autofluorescence screening can be used as an adjunctive method as it is a simple, inexpensive and non-invasive complementary examination method. Although its specificity is controversial, it has a high sensitivity value, so it can be useful in evaluating suspicious lesions during intraoral examination.

Keywords: fluorescence, local anesthesia, oral ulcer, squamous cell carcinoma

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ÖZ

Diş hekimliğinde lokal anestezi uygulamaları yaygın ve güvenilir uygulamalardır. Ancak palatinal mukozanın sıkı ve yoğun yapısı nedeniyle anestezi sonrası bazen ülserasyon, nekroz ve mukoza dökülmesi gibi komplikasyonlar ortaya çıkabilmektedir. Bu komplikasyonlar ağız kanseri olarak yanlış teşhis konulmasına sebep olabilir. Bu olgu sunumunda, akut pulpitis ağrısıyla diş hekimi kliniğine başvuran 45 yaşındaki kadın hastada, lokal anestezi sonrası gelişen şüpheli lezyonun, VELscope® otofloresan inceleme yöntemi ile değerlendirilmesi amaçlanmıştır.

Otofloresans görüntüleme basit, uygun maliyetli ve non-invaziv bir yardımcı inceleme yöntemidir. Spesifikliği tartışmalı olsa da duyarlılık değeri yüksek olduğundan ağız içi muayene sırasında şüpheli lezyonların değerlendirilmesinde faydalı olabilmektedir.

Anahtar Kelimeler: floresan, lokal anestezi, oral ülser, skuamöz hücreli karsinom

INTRODUCTION

Local anesthesia applications are used in a variety of dental procedures. It is used to ensure the comfort of both the patient and the dentist. However, sometimes local anesthesia can lead to a number of unexpected consequences. Various complications can occur such as allergy, trismus, edema, infections, hematoma, prolonged pain, paralysis, postanesthetic intraoral lesions and tissue necrosis (Jastak & Yagiela, 1981; Bennet, 1990). Palatal tissues are prone to mucosal lesions after the application of local anesthetics due to their dense, firm and adherent structure (Gogna et al., 2015). Local anesthetic injections should be administered carefully to avoid putting pressure on blood vessels which can lead to ulceration and necrosis.

Autofluorescence screening technology is used in endoscopic devices for skin evaluation, esophageal

examination, colonoscopy and bronchoscopy. Recently, it has been used as an adjunct to conventional intraoral examination for non-invasive evaluation of the oral mucosa. Autofluorescence is facilitated by fluorochromes found in the submucosa and epithelial cell lining, such as nicotinamide adenine dinucleotide, oxidized flavine adenine dinucleotide, collagen, elastin, and keratin, which can be excited at different wavelengths. Because of absorption and scattering, the typical intrinsic pattern of autofluorescence is changed. It has been claimed that this technique, as an aid, can detect early dysplastic changes (Erçalık Yalçınkaya, 2013).

The VELscope® (LED Dental, Burnaby, British Columbia, Canada) can be used as an aid method to differentiate benign lesions and potentially malignant oral lesions from oral cancer and to determine the appropriate biopsy site for incision as it was also recommended by the World Health Organization (Shashidara et al., 2014). VELscope® works by emitting light with a wavelength of 400–460 nm, which stimulates the fluorophores in the oral epithelium using a digital camera. Healthy epithelial tissue appears green, while dysplastic tissue appears darker than surrounding fields due to loss of fluorescence (Farah et al., 2012; Erçalık Yalçınkaya, 2013; Cicciù et al., 2017).

This case report describes a postanesthetic oral ulcer in a 45-year-old female patient. The patient was referred to our clinic with a preliminary diagnosis of oral squamous cell carcinoma (OSCC).

CASE REPORT

A 45-year-old woman with no past medical history was referred to the Outpatient clinic of Oral and Maxillofacial Radiology with a complaint of a painful ulcer on the right palatal mucosa of 10 days duration. The patient's history revealed that she had visited the dentist with severe pain due to acute pulpitis of the right maxillary second molar. Local anesthesia was applied to the buccal and palatal mucosa of the second molar area for pain relief. The patient reported that the palatal mucosa suddenly became very swollen immediately after the administration of local anesthetic. The patient stated that she had visited several dental clinics due to the non-healing and painful lesion. In addition, the patient reported that dentists suspected oral cancer and immediately referred her for further investigation.

Intraoral examination revealed a single ovoid ulcer covered by a pseudo-membrane with well-defined erythematous swollen margins on the right posterior palatal mucosa (Fig. 1a). The lesion was painful and the patient stated that the pain increased on palpation. The lesion was approximately two centimeters (cm) in diameter and one cm deep. Extraoral examination showed no evidence of lymphaneopathy. The VELscope® autofluorescence method was used and it showed reduced peripheral and superficial autofluorescence compared to healthy palatal tissue (Fig. 1b).
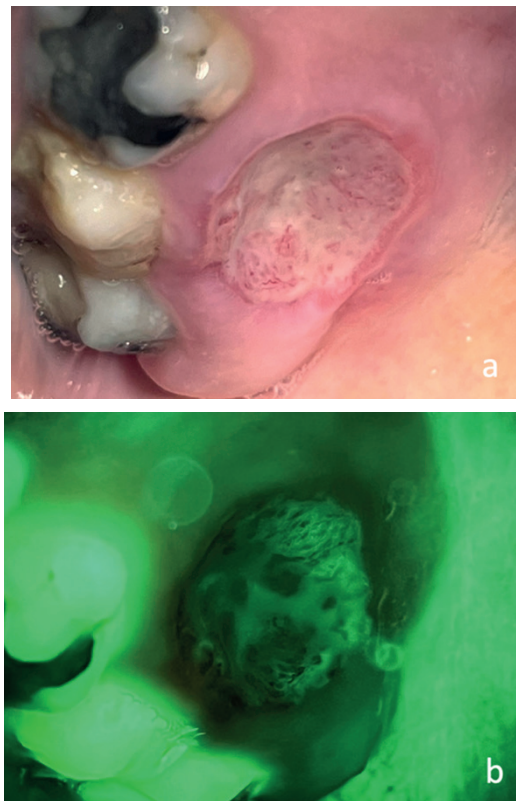

Figure 1: Intraoral examination (a) and VELscope® examination (b) of the lesion. Please note the reduced peripheral and superficial autofluorescence.

Symptomatic treatment and clinical follow-up of the lesion at regular intervals were decided upon the lesion was examined intraorally once a week. The patient was prescribed naproxen sodium as a non-steroidal anti-inflammatory drug and dexpanthenol for epithelialization. The healing process was recorded and the pain was significantly reduced one week after the symptomatic medication (Fig. 2). The autofluorescence of the lesion was similar to that of the healthy palatal tissue at the second follow-up (Fig. 3). Significant epithelialization was observed at the fourth follow-up visit (Fig. 4). Complete healing was observed after approximately 2 months (Fig. 5).
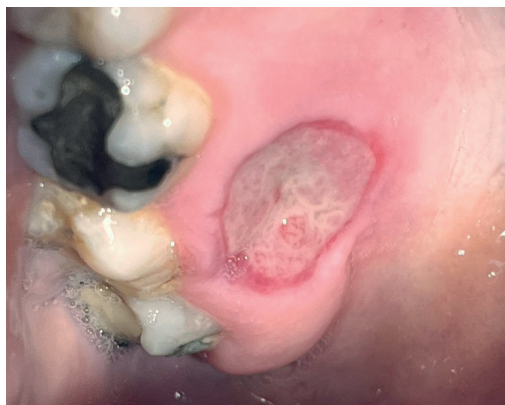
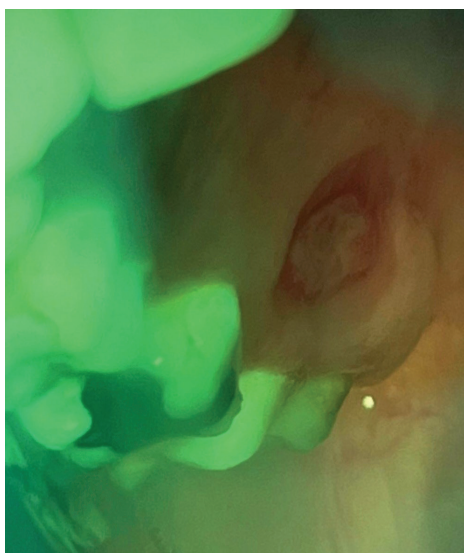**Figure 2:** Intraoral examination of the lesion after the symptomatic medication.

Figure 3: VELscope® examination of the lesion at the second follow-up. Please note the similar autofluorescence of the lesion and healthy mucosa.

Figure 4: Intraoral examination of the lesion with significant epithelization.

Figure 5: Intraoral examination of the lesion and complete recovery after 2 months.

DISCUSSION

The dense, constricted and rigid nature of the palatal mucosa can lead to ulceration and necrosis after rapid and compressive injections. The lesion may be observed and initially diagnosed as OSCC or other oral malignancies.

OSCC is an invasive malignant epithelial neoplasia and the mortality rate increases with delay in early diagnosis (Llewellyn et al., 2004). According to recent studies, approximately 60% of patients with oral cancer are diagnosed at stages III and IV. Early diagnosis of oral squamous cell carcinoma, which is critical for prognosis, can be achieved by using various materials and methods in addition to intraoral screening. Cytological examination, molecular biological techniques, PCR tests, and autofluorescence techniques can be used as adjunctive methods (Jemal et al., 2005). However, histopathological examination is the gold standard for definitive of OSCC (Neville et al., 1995).

New and popular approaches to oral cancer screening include autofluorescence techniques, such as VELscope®. It provides a rapid and non-invasive preliminary diagnosis. It can also be used in daily clinical practice (Balasubramaniam et al., 2015). The principle of the device is based on the detection of biochemical changes. Biochemical changes often precede obvious morphological changes so this method can detect oral potentially malignant disorders at an early stage (Kumar & Krishna, 2019).

In a previous study by Cânjău et al. (Cânjău et al., 2018), VELscope® images were evaluated and areas of visual fluorescence loss were detected. They reported that the normal vascularisation of the tissue, the presence of

infection, potentially malignant oral lesions and OSCC may involve loss of autofluorescence. In the present case report, the loss of autofluorescence was detected in a benign ulceration of the palatal mucosa (Fig. 1b). However, at the second follow-up, the autofluorescence of the lesion was similar to that of the healthy oral mucosa (Fig. 3). It is crucial to reevaluate any oral mucosal lesion within 14 days to determine whether the lesion has healed or persisted. VELscope® method can be used as an adjunctive chair-side screening device with clinical follow-up in association with the knowledge and experience of the clinician (Erçalık Yalçınkaya, 2013).

The specificity and sensitivity of this technique have been investigated in many studies with varying results. In a study by Sharma et al. (Sharma et al., 2022), 250 patients with suspicious oral lesions were examined with VELscope®. The autofluorescence findings of these patients were compared with histopathological examination. The aforementioned showed that VELscope® had a sensitivity of 75% and a specificity of 61%. Wang et al. (Wang et al., 2022) evaluated 59 potentially malignant oral lesions with VELscope® and compared them with the histopathological findings. The subjective sensitivity and specificity were found to be 76% and 64%, respectively. However, the results of the objective method showed a sensitivity of 64% and a specificity of 82%. It was concluded that the objective fluorescence method can be also used even in low-risk lesion detection.

Vibhute et al. (Vibhute et al., 2021) evaluated 30 patients with potentially malignant oral lesions using the VELscope® method. Histopathological results showed 90% sensitivity and 44% specificity. Above study concluded that the VELscope® method can be used as a complementary diagnostic tool but cannot replace the conventional method. Similar to this study, Amirchaghmaghi et al. (Amirchaghmaghi et al., 2018) examined 45 patients with potentially malignant oral lesions and evaluated the VELscope® method. Their research showed that the VELscope® method had a sensitivity of 90% and a specificity of 15%. In addition, the authors suggested that the VELscope device could used to increase the sensitivity of conventional intraoral examination. Erçalık Yalçınkaya et al. (Erçalık Yalçınkaya et al., 2015) suggested that the use of the VELscope® device together with the oral conventional examination may be helpful in the diagnosis of malignant lesions. However, due to the low specificity values, VELscope® screening is still not considered a definite method to differentiate between oral benign and malignant oral lesions.

Cânjău et al. (Cânjău et al., 2018) evaluated 18 patients with suspicious lesions of the oral mucosa. They demonstrated VELscope®'s 94% sensitivity and 100% specificity. Compared to other studies, the specificity rate was found to be significantly higher and the authors concluded that the VELscope® method is a useful and effective complementary method. As a result of the evaluation of VELscope® studies, it was found that the rate of sensitivity ranged from 64% to 94%; however, the rate of specificity ranged from 15% to 100% (Table 1).

Table 1. Selected previous studies evaluating the sensitivity and specificity of the VELscope® screening method

Researchers	Year	Lesion	Sample Size	Sensitivity(%)	Specificity(%)
Sharma et al.	2022	Suspicious oral mucosal lesions	250	75	61
Wang et al.	2022	Potentially malignant oral lesions (subjective assessment)	59	76	50
		Potentially malignant oral lesions (objective assessment)	59	64	82
Vibhute et al.	2021	Suspicious oral lesions	30	90	44
Amirchaghmaghi et al.	2018	Suspected OSCC and dysplasia	45	90	15
Cânjău et al.	2018	Oral potentially malignant lesions	18	94	100

CONCLUSION

In conclusion, the VELscope® method is a simple, cost-effective, non-invasive adjunctive tool with relatively high sensitivity. The device provides real-time guidance and can be also used intraoperatively to identify surgical tumor margins or incisional biopsy margins. Still, it may give false negative and/or false positive results during the evaluation of oral lesions; therefore, this situation should be taken into consideration when using it as an adjunctive method.

Patient Consent:

The patient was informed and a consent form was obtained for the use of their data.

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Conflict of Interest: None

REFERENCES

1. Amirchaghmaghi M, Mohtasham N, Delavarian Z, Shakeri MT, Hatami M, Mosannen Mozafari P. The diagnostic value of the native fluorescence visualization device for early detection of premalignant/malignant lesions of the oral cavity. Photodiagnosis Photodyn. Ther. 2018; 21:19-27.

2. Balasubramaniam AM, Sriraman R, Sindhuja P, Mohideen K, Parameswar RA, Muhamed Haris KT. Autofluorescence based diagnostic techniques for oral cancer. J. Bioallied Sci. 2015 ;7(2):374-377.

3. Bennet CR. Monheims Local Anaesthesia and Pain Control in Dental Practice. Delhi: CBS Publishers and Distributors;1990.

4. Cânjău S, Todea DCM, Sinescu C, Pricop MO, Duma VF. Fluorescence influence on screening decisions for oral malignant lesions. Rom. J. Morphol. Embryol. 2018;59(1):203-209.

5. Cicciù M, Herford AS, Cervino G, Troiano G, Lauritano F, Laino L. Tissue Fluorescence Imaging (VELscope) for Quick Non-Invasive Diagnosis in Oral Pathology. J. Craniofac. Surg. 2017;28(2):112-115.

6. Erçalık Yalçınkaya Ş, Aksakallı N, Elçin MA, Dumlu A, Alatlı C, Özbayrak S. Evaluation of a fluorescence screening method in the detection of oral pre – and malignant lesions.

Oral Surg. Oral Med. Oral Pathol. Oral Radiol. 2015; 119(3):175

7. Erçalık Yalçınkaya Ş. Oral prekanseröz lezyonlarda doku otofloresansı esaslı ışıkla değerlendirme yöntemi: Derleme. Clin. Exp. Health. Sci. 2013;3(2):107-113.

8. Farah CS, McIntosh L, Georgiou A, McCullough MJ. Efficacy of tissue autofluorescence imaging (VELScope) in the visualization of oral mucosal lesions. Head Neck. 2012;34(6):856-862.

9. Gogna N, Hussain S, Al-Rawi S. Case reports: Palatal mucosal necrosis after administration of a palatal infiltration. Br. Dent. J. 2015 Dec 18;219(12):560-561.

10. Jastak JT, Yagiela JA. Regional Anesthesia of the Oral Cavity. St. Louis: The C.V. Mosby Company; 1981.

11. Jemal A, Murray T, Ward E, Samuels A, Tiwari RC, Ghafoor A, Feuer EJ, Thun MJ. Cancer statistics, 2005. CA Cancer J. Clin. 2005;55(1):10-30.

12. Kumar P, Krishna CM. Optical techniques: Investigations in oral cancers. In: Panta P, editors. Oral Cancer Detection. Cham: Springer; 2019.

13. Llewellyn CD, Johnson NW, Warnakulasuriya S. Factors associated with delay in presentation among younger patients with oral cancer. Oral Surg. Oral Med. Oral Pathol. Oral Radiol. Endod. 2004;97(6):707-713.

14. Neville BW, Damm DD,Allen CM,Chi AC. Oral and maxillofacial pathology. W. B. Saunders: Philadelphia;1995.

15. Sharma A, Sharma A, Bansal AK, Goyal C, Mankotia S, Parmar M, Mahant S. To evaluate the efficacy of tissue autofluorescence (Velscope) in the visualization of oral premalignant and malignant lesions among high-risk population aged 18 years and above in Haroli block of Una, Himachal Pradesh. J. Int. Soc. Prev. Community Dent. 2022;12(3):365-375.

16. Shashidara R, Sreeshyla HS, Sudheendra US. Chemiluminescence: a diagnostic adjunct in oral precancer and cancer: a review. J. Cancer Res. Ther. 2014;10(3):487-491.

17. Vibhute NA, Jagtap SV, Patil SV. Velscope guided oral cancer screening: a ray of hope in early oral cancer diagnosis. J. Oral Maxillofac. Pathol. 2021;25(3):548-549.

18. Wang C, Qi X, Zhou X, Liu H, Li M. Diagnostic value of objective VELscope fluorescence methods in distinguishing oral cancer from oral potentially malignant disorders (OPMDs). Transl. Cancer Res. 2022;11(6):1603-1615.